EE/CPRE/SE 491 - sddec24-13

ReRAM Compute ASIC Fabrication

Weekly Report 1

1/23/24 - 2/6/24

Client: Prof. Henry Duwe

Advisor: Prof. Cheng Wang

Team Members:

- Gage Moorman - Team Organizer, main analog designer
- Konnor Kivimagi - Main documentation editor, mixed analog digital designer
- Nathan Cook – Main client liaison, mixed analog digital designer
- Jason Xie – assistant documentation editor, main digital designer

Weekly summary:

This week was used to start getting familiarized with the tools being used and learn more about our objective on this project as a whole. We met with our client and advisor and reviewed and explored more of what the project would entail in terms of deliverables, research, depth of knowledge, and skills that we would need to learn or revisit. This week we were able to SSH into the lab computers which contain the tool flow that we will be using for our simulations, however, we have not been able to get the open-source software we will be using up to design and test our project on.

Past Week Accomplishments

- Assigned team roles and responsibilities
- Researched ReRAM cells and peripheral devices that need to be implemented
- Got remote access to the Durham 310 computers working, these are the lab computers that contain the projects workflow
- Planned a rough schedule of when we should meet deliverables

Individual Contributions:

Team Member	Contributions	Weekly hours	Total Hours
Konnor Kivimagi	Worked on getting the tool flow set up and understanding ReRAM	6	6
Gage Moorman	Attempted getting open-source tools running, Researched ReRAM and other RAM architectures	6	6
Nathan Cook	Got remote access to the project's tool flow but have not been able to install any of the open-source tools needed for the project	6	6
Jason Xie	Attempted to set up Magic VLSI and its dependencies. Began setting up the required tool suite on personal laptop.	6	6

Pending Issues:

- Getting the tool flow to work
- Installing the rest of the required open-source tools like Klayout and GTKWave

Plans for the coming week:

- Gage Moorman
    - Finish setting up open-source tools and follow the design flow using previous groups inverter
    - Practice using the tools and workflow
- Konnor Kivimagi
    - Spend more time with the tools and find a way to get them operating remotely
- Nathan Cook
    - Finish setting up open-source tools and begin learning how to use the tools to recreate what previous groups have done
    - Skim previous project reports to learn more about what has been done and how we can move the research done forward
- Jason Xie
    - Complete tool setup and begin recreating inverter DAC

Summary of Advisor Meeting:

- Discussed the broad goals of the project
    - The overall goal is to design and improve upon an idea that has been brought up through multiple years of projects that will allow Iowa State to begin teaching computer architecture principals in students' freshman year so that they can bring up a processor with them through their final year of college
- Discussed previous groups progression
    - Group before us had figured out the ADC and DAC converters for the ReRAM however client and advisor both believe that they can be made better, this is our main deliverable for the next 2 semesters
- Deliverables (2/6/2024)
    - Access the tools and get comfortable using them
    - Create project descriptions and finalize project requirements

Pre-check approved GS2

Simulations showing correct function

Bring-up plan for success/failure for chip fab

"Research vehicle for silicon proving computational ReRAM for research and education purposes"